



Diabetes: The 2007 Guidelines

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ADA 2007 Clinical Practice Recommendations

- Why is this important?
- Current screening guidelines
- 6 cornerstones of diabetes
- New developments
- Questions!!

Why is this important?

- Type 2 DM is most prevalent form
- 7.9% of adults have diagnosed/undiagnosed diabetes
 - 4-fold more likely to have a MI.
 - 8-fold more likely to die from first MI.
 - Leading cause of blindness ages 20-74.
 - 1/3 of all cases of legal blindness.
 - Most common cause of ESRD
 - 1/3 of all dialysis patients.
 - #2 cause of amputations.
- Leading Healthcare Expenditure in U.S

**Medical Management Can Change All of
the Above**

Screening



- 2025, 9% of U.S. population will be diabetic
- 5.2 million undiagnosed diabetics in U.S
- Diagnosis latency for Type 2 DM is 4.2 years
- Polyuria, polyphagia, and polydypsia are very unreliable screening indicators.

Risk Factors



- Family History
- Obesity (BMI > 25)
- Race/Ethnicity (African-American, Hispanic-American, Native Americans, Asian Americans, Pacific Islanders)
- Age > 45
- Hypertension (> 140/90)
- HDL Cholesterol < 35
- Triglycerides > 250
- History of GDM
- History of Macrosomia
- Polycystic Ovarian Disease
- Previous Abnormal Screening
- Physically Inactive
- Vascular Disease

Screening Recommendations

- Patients at high-risk for diabetes (2-3 risk factors) screened every 3 years
 - IGT/IFG - Screen every 1-2 years
- Screening Tests
 - Fasting Plasma Glucose - Preferred - accuracy, ease, low-cost.
 - 2 hour OGTT (75 gm glucose load)
 - Random Plasma Glucose - very inaccurate, discourage use.
 - HgA1C - NOT a screening test.

**Repeat and Confirm all Screening Tests
in 24 Hours!**

Screening Tests

<u>Normal</u>	<u>IFG or IGT</u>	<u>Diabetes</u>
FPG < 109	FPG 110-125	FPG \geq 126
2hPG < 139	2hPG 140-199	2hPG \geq 200
		Random \geq 200

Cornerstones of Diabetes Management?

- Glycemic Control
- Hypertension
- Hyperlipidemia
- Nephropathy
- Retinopathy
- Foot Care

Glycemic Control

- HgA1C is the gold standard
- SMBG is an integral component of diabetes management – Expert Consensus
- All treatment decisions for Type 2 Diabetics should be based on A1C levels
 - Check A1c twice each year in all patients
- SMBG is extremely valuable in tailoring therapy to a specific patient

Glycemic Control

A1C%

Mean Plasma Glucose
(mg/dl)

6	135
7	170
8	205
9	240
10	275
11	310
12	345

Glycemic Control

- HgA1C < 6% - normal.
- HgA1C < 7% - goal.
- HgA1C 7.0 - 7.5% - good control.
- HgA1C > 7.5% - additional therapy
- Pre-prandial glucose 90-130 mg/dl
- Peak postprandial glucose < 180 mg/dl
- **HgA1C every 3 months unless at goal then every 6 months.**

Hypertension

- Goal B/P < 130/80
- Treat all patients > 130/80
 - MNT for 130-139/80-89
 - Drug treatment - > 140/90
- ACEI/ARB's are drugs of choice
- Beta-blockers may improve myocardial outcome - do not mask hypoglycemia.
- Calcium Channel Blockers – ALLHAT Study

Hypertension

- UKPDS - 21% reduction in CAD events and morbidity (B/P < 144/82)
 - Atenolol vs. captopril
- HOT – CAD events decreased from 9% to 4% over 3.8 years when the diastolic was lowered from 90 to 80 mm Hg
 - Felodipine/ACE Inhibitor
- Syst-Eur – CAD events decreased from 12% to 5% over 2 years when the systolic was lowered 20 mm Hg
 - Enalapril/HCTZ

Hypertension

- ALLHAT – Largest Anti-Hypertensive Study
 - 42,000 patients followed over 6 years
 - Diuretic vs. lisinopril vs. amlodipine
 - Alpha-blocker arm d/c'd early due to CHF
 - Cardiovascular events were the same in all three study arms
- ADA Recommends:
 - ACE/ARB as first-line
 - Consider diuretic as first addition
 - CCB or beta-blocker third line

Hyperlipidemia

- Most common lipid abnormality: elevated triglycerides followed by reduced HDL.
- LDL levels are usually not elevated compared to non-diabetic population.
- LDL particles are more atherogenic in diabetic patients.

Hyperlipidemia

- Primary Prevention

- AFCAPS/TexCAPS – 37% reduction in CAD events (lovastatin)
- SENDCAP – reduction in induced ischemia (bezafibrate)
- Helsinki Heart Study – 7% reduction in CAD events (gemfibrozil)
- Heart Protection Study – 25% reduction in first CAD when LDL lowered by 30% (simvastatin)
- CARDS – 40% reduction in first CAD/stroke (atorvastatin)

- Secondary Prevention

- CARE - 27% reduction CAD events (pravastatin)
- 4S – 55% reduction CAD events (simvastatin)
- VA-HIT - 24% reduction CAD events (gemfibrozil)

Priorities of Lipid Management



- First, lower LDL cholesterol.
- Second, raise HDL cholesterol.
- Third, lower Triglyceride levels.

Lipid Lowering Medications

- Drug of Choice: HMG CoA Reductase Inhibitors (the Statins).
 - Second Line: Fibric Acid Derivatives.
 - Third Line: Bile Acid Resins
 - Relatively Contraindicated: Niacin
- Maximal Medical Nutrition Therapy has been shown to lower LDL by no more than 20mg/dl**

Testing for Hyperlipidemia

- All diabetics should have a full lipid profile done annually
- Any diabetic being treated should have lipid profiles done every 3-6 months until goal is reached.
- Once goal is reached, lipid profiles should be done every 6 - 12 months.

Treatment Goals for Hyperlipidemia

	<u>Nutrition Therapy</u>		<u>Drug Therapy</u>	
	<u>Start</u>	<u>Goal</u>	<u>Start</u>	<u>Goal</u>
CAD	≥ 100	< 100	≥ 100	< 100
No CAD	≥ 100	< 100	≥ 130	< 100

Nephropathy

- Incipient Nephropathy - characterized by microalbuminuria.
- Overt Nephropathy - characterized by clinical albuminuria.
- End Stage Renal Disease - characterized by a declining GFR.
- ANNUAL SCREENING REQUIRED
 - Microalbuminuria
 - Serum creatinine

Screening Tests for Albuminuria

- Albumin-to-creatinine ratio in random spot urine collection.
- 24 hour urine albumin and creatinine collection.
- Timed (4 hour) urine albumin and creatinine collection.

Screening Tests for Albuminuria

- Albumin-to-creatinine ratio in random spot collection preferred.
- Falsely elevated - hyperglycemia, UTI, exercise, marked hypertension, CHF, and fever
- Day-to-day variation in albuminuria.

Microalbuminuria must be confirmed with 2-3 collections over 6 months to diagnose incipient nephropathy

Screening Test Results

Collection Method

	Spot (<u>ug/mg</u> <u>Creatinine</u> <u>)</u>	24-Hour (<u>mg/24h</u>)	Timed (<u>ug/min</u> <u>)</u>
Normal	< 30	< 30	< 20
Micro- albuminuria	30-299	30-299	20-199
Clinical Albuminuria	≥ 300	≥ 300	≥ 200

Treatment of Nephropathy

- Optimize Glycemic Control.
- Optimize Hypertension Management.
- ACE Inhibitors - even if normotensive.
- If intolerant of ACE Inhibitors - ARB's have similar supporting data
- Protein Restriction to 0.8mg/kg/day - once CKD develops.

Retinopathy

- 21% of Type 2 diabetics have evidence of retinopathy at time of diagnosis.
- Treatment available by both Laser Photocoagulation and Argon Laser therapy - best treated by experienced ophthalmologist.
- Screen can be done by qualified optometrist and/or ophthalmologist.

Natural History of Retinopathy

- Mild Non-Proliferative Retinopathy - increased vascular permeability
- Moderate to Severe Non-Proliferative Retinopathy - vascular closure
- Proliferative Retinopathy - regrowth of new vessels on retina and posterior surface of the vitreous.

Screening Recommendations for Retinopathy

<u>Patient Group</u>	<u>First Exam</u>	<u>Follow- Up</u>
Type 1 Diabetes	3-5 years after diagnosis (age > 10)	Yearly
Type 2 Diabetes	When diagnosed	Yearly

Foot Care



- Annual Foot Exam Looking for High-Risk Conditions.
- Foot Exams at Every Visit.
- Professional Foot Care for Patients with One or More Risk Factors.
- Daily Foot Care for All Patients - Patient Instruction on Nail and Skin Care

Annual Foot Exam

- Components:
 - Monofilament testing for sensory loss
 - Skin exam
 - Examination of foot anatomy/dystrophies
 - Vascular exam

Risk Factors for Foot Disease



- Peripheral Neuropathy
- Altered Biomechanics
- Evidence of Increased Pressure (callus, erythema, bruising)
- Decreased Joint Mobility
- Bony Deformity
- Marked Nail Pathology
- Peripheral Vascular Disease
- History of Amputation
- History of Foot Ulcer

New Developments - Prevention

- Finnish Study:
 - Intense MNT vs Control
 - Average Follow-up 3.2 years
 - 58% risk reduction for diabetes
- Diabetes Prevention Program (DPP):
 - Intense MNT vs Metformin vs Placebo
 - Average Follow-up 2.8 years
 - 58% risk reduction for diabetes for MNT
 - 31% risk reduction for diabetes for Metformin

New Developments - Prevention

- Troglitazone Prevention of Diabetes (TRIPOD):
 - Troglitazone vs placebo
 - Average follow-up 2.5 years
 - 58% risk reduction for diabetes
- STOP-NIDDM:
 - Acarbose vs placebo
 - Average follow-up 3.3 years
 - 36% risk reduction for diabetes

New Developments - Children

- Type 2 Diabetes in Children
 - Included in 2003 Guidelines – significant update in 2006 guidelines
 - Screening Addressed
 - ? Standards for Hypertension and Lipid Management

More Information to Follow in Upcoming Years